**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
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OFFICE OF
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CLEANUP

Lynn Manolopoulos
Davis Wright Tremaine LLP
777 108th Ave. NE
Suite 2300
Bellevue, WA 98004

February 20, 2018

**Re: STAR Implementation Sites**

Dear Ms. Manolopoulos:

This letter provides information on the use of STAR at other sites. You requested this information during our conference call on January 31, 2018. I am including a summary table of the field pilots conducted to date. Note, that the New Jersey site is in the process of full-scale implementation, and expected to be completed in 2018.

| Location | Contaminant Type | Concentration Reductions |
|---|---|---|
| New Jersey, USA | Coal tar | 99.3% (TPH) |
| New Jersey, USA | Coal tar | 97.3% (EPH) |
| Belgium | Coal tar | 91.0% (TPH) |
| Illinois, USA[1] | Coal tar | - |
| Michigan, USA | Coal tar | 98% - 99% (TPH) |
| Michigan, USA | Coal tar | >99% (TPH) |
| Virginia, USA | Navy Special Fuel Oil (NSFO) | 97.6% (TPH) |
| Michigan, USA | Gasoline/Diesel Range Organics | 99.9% (TPH) |
| Michigan, USA | Gasoline/Diesel Range Organics | >90% (TPH) |
| Toronto, Canada[2] | Petroleum Hydrocarbons | >99% (TPH) |
| Chia-Yi, Taiwan[3] | Petroleum Hydrocarbons | TBD |
| Kaohsiung, Taiwan[3] | Petroleum Hydrocarbons | TBD |

[1] Large void spaces prevented propagation of the smoldering reaction.
[2] In progress.
[3] Mobilizing for operations starting in February 2018.

In response to the concerns outlined in your October 27, 2016 letter, which EPA addressed in our prior meeting with your contractors, the bullets below provided additional information related to potential effectives of STAR at the Quendall Terminal Site.

Regarding the ability of STAR to treat NAPL present in multiple layers:

- Based on discussions with Savron, STAR has been effective in treating different NAPL layers with some vertical separation. For example, a field pilot for the Navy demonstrated treatment of two NAPL layers separated by a 4-inch thick seam of clay. During testing, heat and injected air worked through the clay seam to combust both contaminated layers. Where large vertical separation between contaminated layers is present, treatment would likely require multiple ignition events. For example, at the New Jersey site, where 12 feet of clean soil separated NAPL-containing layers, two ignition events were performed (first two line items in the table above).

- It is anticipated that multiple, distinct horizons of impacted soils at a given location at the Quendall site will likely require separate ignition events. The goal of an upcoming field pilot is to provide the necessary data (radius of influence, propagation rate, vapor treatment requirements) to assemble an FS-level estimate of cost for use of STAR at the site. The conceptual site model (CSM) can inform us about the anticipated frequency of multiple NAPL layers at a given location at the Site, and the need to account for multiple ignition events in estimating cost for the FS.

Related to your concern that the Quendall Site soils (peat and silt) will inhibit air flow:

- Based on discussions with Savron, STAR has successfully combusted through lower permeability layers (silts and peat) at other sites. In addition, the presence of peat may provide supplemental fuel for maintenance of STAR processes in the subsurface.

- At Quendall, NAPL is typically encountered in sands bordered by lower permeability layers. Sand layers are expected to be conductive and capable of transferring sufficient oxygen to support the combustion processes when NAPL is present. There is also potential for partial treatment along the low permeability boundary layers if air traveling through the sand layer reaches a sufficient supply of NAPL to support combustion. The presence of low permeability boundaries may also act to focus air injected for combustion to locations where NAPL resides, increasing the potential for development of smoldering conditions in situ. Completion of the pilot will allow for evaluation of these conditions.



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Please contact myself or our attorney, Ted Yackulic, if you have questions. I can be reached at (206) 553-2589. Ted's number is (206) 553-1218.

Sincerely,

Kathryn Cerise, Remedial Project Manager
Port Quendall Terminals Superfund Site

Attachment:

cc:



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